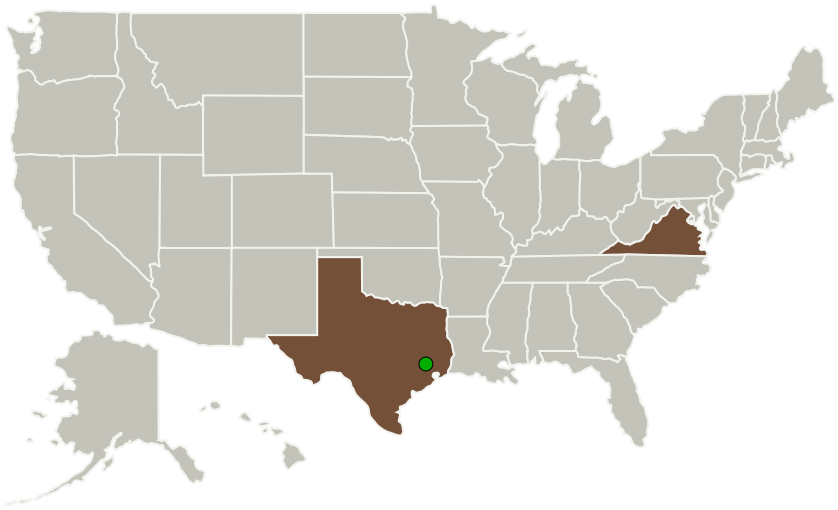
Self-Healing, Self-Diagnosing Multifunctional Hybridsil Composites for EVA Space Suit Pressure Garment Systems, Phase I

Completed Technology Project (2015 - 2015)

Project Introduction

Through the proposed NASA SBIR program, NanoSonic will work with ILC Dover to design, empirically optimize, and integrate multifunctional self-healing and self-diagnosing HybridSil composites for lighter weight EVA space suit pressure garment systems with enhanced durability and reliability. To that end, NanoSonic will create multifunctional, highly flexible HybridSil polymeric armor composites composed of high strength, electrically conductive fabrics embedded within highly flexible inorganic copolymer matrices containing dispersed, VOC-free self-healing polymeric capsules. NanoSonic's multifunctional, single-ply HybridSil space suit composites will be tailored for use within existing space suit layups and afford significant weight savings by enabling the use of less layers to achieve given a performance goal such as micrometeoroid and orbital debris protection, thermal control / insulation, and radiation protection. The proposed HybridSil composites will build from NanoSonic's pioneering laceration, abrasion, and puncture resistance drysuit, wetsuit, and fire protective fabric technologies. A nimble Phase III transition of optimized multifunctional HybridSil fabrics will be afforded by NanoSonic's established roll-to-roll flexible composite manufacturing infrastructure.

Primary U.S. Work Locations and Key Partners



SELF-HEALING, SELF-DIAGNOSING MULTIFUNCTIONAL HYBRIDSIL COMPOSITES FOR EVA SPACE SUIT PRESSURE GARMENT SYSTEMS, Phase I

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Organizations Performing Work	Role	Type	Location
Nanosonic, Inc.	Lead Organization	Industry	Pembroke, Virginia
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Texas	Virginia

Project Transitions

June 2015: Project Start

December 2015: Closed out

Closeout Summary: SELF-HEALING, SELF-DIAGNOSING MULTIFUNCTIONAL H YBRIDSIL COMPOSITES FOR EVA SPACE SUIT PRESSURE GARMENT SYSTEMS, P hase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/139432)*

Images

Briefing Chart Image
SELF-HEALING, SELF-DIAGNOSING MULTIFUNCTIONAL HYBRIDSIL COMPOSITES FOR EVA SPACE SUIT PRESSURE GARMENT SYSTEMS, Phase I
(https://techport.nasa.gov/image/131838)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Nanosonic, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

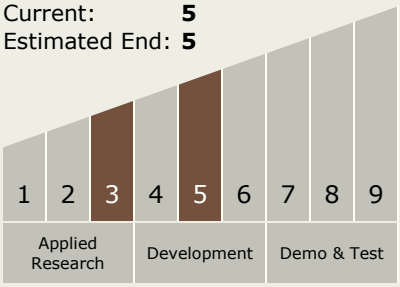
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Victor V Baranauskas

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.1 Pressure Garment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System